

Restoring Pelvic Strength: The Effectiveness of Physiotherapy-Based Pelvic Floor Muscle Training After Childbirth

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Abstract

Background:

Postpartum pelvic floor dysfunction is a common concern that may lead to urinary incontinence, pelvic pain, muscle weakness, impaired coordination, and bowel dysfunction. Physiotherapy plays an important role in preventing and managing these problems through pelvic floor muscle training and adjunctive rehabilitation techniques. This narrative review summarizes recent evidence on physiotherapy-based interventions for postpartum pelvic floor dysfunction.

Methodology:

A narrative review was conducted using seven randomized controlled trials evaluating physiotherapy and rehabilitation interventions for postpartum pelvic floor dysfunction. The included studies investigated pelvic floor muscle training, pelvic girdle and hip muscle strengthening, biofeedback electrical stimulation, virtual reality-assisted rehabilitation, relaxation training, acupoint application, acupuncture, and transcutaneous tibial nerve stimulation. Outcomes included pelvic floor muscle strength and activity, urinary leakage, pelvic pain, bowel symptoms, sexual function, quality of life, and pelvic floor muscle coordination.

Results:

Overall, the reviewed studies demonstrated beneficial effects of physiotherapy-based interventions on postpartum pelvic floor function. Pelvic floor workout during pregnancy reduced the incidence of postpartum stress urinary incontinence and improved muscle strength. Combined interventions such as pelvic floor muscle training with biofeedback electrical stimulation and hip muscle strengthening produced greater improvements in urinary continence and pelvic floor strength than conventional rehabilitation alone. Multimodal approaches incorporating acupuncture and electrical stimulation showed additional benefits for urinary and sexual function. Relaxation training was particularly effective in women with increased pelvic floor muscle tone, while transcutaneous tibial nerve stimulation improved symptoms associated with pelvic floor dyssynergic defecation. Virtual reality provided some improvement in pelvic floor muscle coordination, although its additional effect on pain and muscle structural characteristics was limited.

Conclusion:

Physiotherapy is an important component of postpartum pelvic floor rehabilitation, with evidence supporting both preventive and therapeutic approaches. Pelvic floor muscle training remains a key intervention, while strengthening, biofeedback, electrical stimulation, relaxation, and neuromodulation may provide additional

benefits according to individual clinical needs. A personalized and multimodal physiotherapy approach may improve functional recovery and quality of life following childbirth.

Keywords: Postpartum pelvic floor dysfunction; Physiotherapy; Pelvic floor muscle training; Urinary incontinence; Pelvic rehabilitation; Biofeedback; Pelvic floor strengthening.

INTRODUCTION

Urinary incontinence (UI) is the involuntary leakage of urine and is a common problem following childbirth. [1,2] A systematic review and meta-analysis involving 35,064 women reported a weighted prevalence of postpartum UI of 31.0% between 6 weeks and 1 year after childbirth, with stress urinary incontinence being the most frequently reported subtype. [1] Postpartum UI may persist beyond the early recovery period and can affect women's quality of life and daily activities. [1,4,5]

Several maternal and obstetric factors have been associated with postpartum UI, including urinary incontinence during pregnancy, parity, maternal characteristics, vaginal delivery, and perineal trauma. [3-9] Pregnancy and childbirth place considerable mechanical and functional demands on the pelvic-floor system. Changes in pelvic-floor muscle function and pelvic support following pregnancy and childbirth may contribute to urinary leakage, particularly during activities that increase intra-abdominal pressure. [3,9,10]

Pelvic floor muscle training (PFMT) is a conservative physiotherapy intervention involving repeated voluntary contraction and relaxation of the pelvic-floor muscles. [10-12] It is intended to improve pelvic-floor muscle strength, endurance, coordination, and functional control. [10,11] PFMT may be provided through supervised sessions, home-based exercise, or a combination of both. [11,12] However, programmes differ in exercise dosage, duration, supervision, adherence, and the use of adjunctive techniques such as biofeedback or electrical stimulation. [12,13]

Recent evidence supports PFMT as a relevant conservative approach for postpartum UI, although its effects vary according to the outcome assessed. [12,16] A 2024 systematic review and meta-analysis of conservative interventions reported benefits of supervised PFMT over individual PFMT for urinary-incontinence rates and incontinence-specific quality of life. [16] A 2025 systematic review and meta-analysis involving 65 studies and 21,334 participants also found moderate-certainty evidence that postpartum PFMT reduced the odds of urinary incontinence compared with control conditions, although evidence concerning UI severity remained limited. [22]

More recent evidence concerning women with established postpartum UI has been more cautious. A 2026 systematic review and meta-analysis of 19 randomized controlled trials found significant improvements in pelvic-floor muscle strength and endurance following PFMT, but no statistically significant differences in urinary-incontinence incidence or quality of life compared with control conditions. [24] Similarly, a 2026 meta-analysis found no statistically significant difference in UI severity in direct comparisons between training interventions and control or education groups, although some pre-post analyses demonstrated reductions following PFMT. [25] These findings indicate that improvement in pelvic-floor muscle function does not necessarily result in a corresponding improvement in urinary symptoms.

The way PFMT is delivered may also influence outcomes. Evidence regarding additional benefits from physiotherapist feedback or biofeedback remains inconsistent. [13] A 2024 randomized clinical trial found that pressure-mediated biofeedback combined with supervised PFMT produced greater improvement in UI severity

than PFMT alone. [20] However, findings from one biofeedback study should not be generalized to all feedback-assisted PFMT approaches. [13,20]

It is also important to distinguish between prevention and treatment of established postpartum UI. [15,23] Recent prevention studies suggest that PFMT delivered during pregnancy or the postpartum period may reduce the incidence of postpartum UI. [15,23] However, prevention findings cannot be directly interpreted as evidence of treatment effectiveness in women who already experience urinary leakage.

Overall, current evidence supports PFMT as an important conservative physiotherapy intervention for postpartum UI, but its effects are not consistent across all outcomes. [16,24,25] Evidence is stronger for improvement in pelvic-floor muscle function than for reductions in UI severity or improvements in quality of life. [24,25] Differences in intervention protocols, supervision, adherence, participant characteristics, and outcome measures may contribute to this variation. [13,16,24,25] Although PFMT has been widely investigated in relation to postpartum urinary incontinence, uncertainty remains regarding the extent to which it produces meaningful improvements in urinary symptoms among women with established UI. [16,24,25] Recent evidence demonstrates improvements in pelvic-floor muscle strength and endurance, while effects on urinary-incontinence incidence, severity, and quality of life remain less consistent. [24,25]

The existing literature is also heterogeneous in terms of treatment duration, exercise dosage, supervision, adherence, timing after childbirth, and use of adjunctive interventions. [12,13,16,20]

The 2026 systematic review found significant improvements in pelvic-floor muscle strength and endurance without significant differences in UI incidence or quality of life between PFMT and control conditions. [24]

Evidence regarding supervised and feedback-assisted PFMT is also not completely consistent. [13,16] Supervised PFMT has demonstrated benefits for some outcomes, whereas evidence regarding the additional effect of physiotherapist feedback or biofeedback remains limited. [13,16] A recent randomized clinical trial reported beneficial effects from pressure-mediated biofeedback combined with supervised PFMT, but this finding requires confirmation in further studies. [20]

Methodology

Study Design

A **narrative review** was conducted to assess the effectiveness of **pelvic floor muscle training (PFMT) in reducing urinary incontinence among postpartum women**. Relevant published literature was identified, reviewed, and synthesized to provide an overview of the available evidence regarding PFMT and postpartum urinary incontinence.

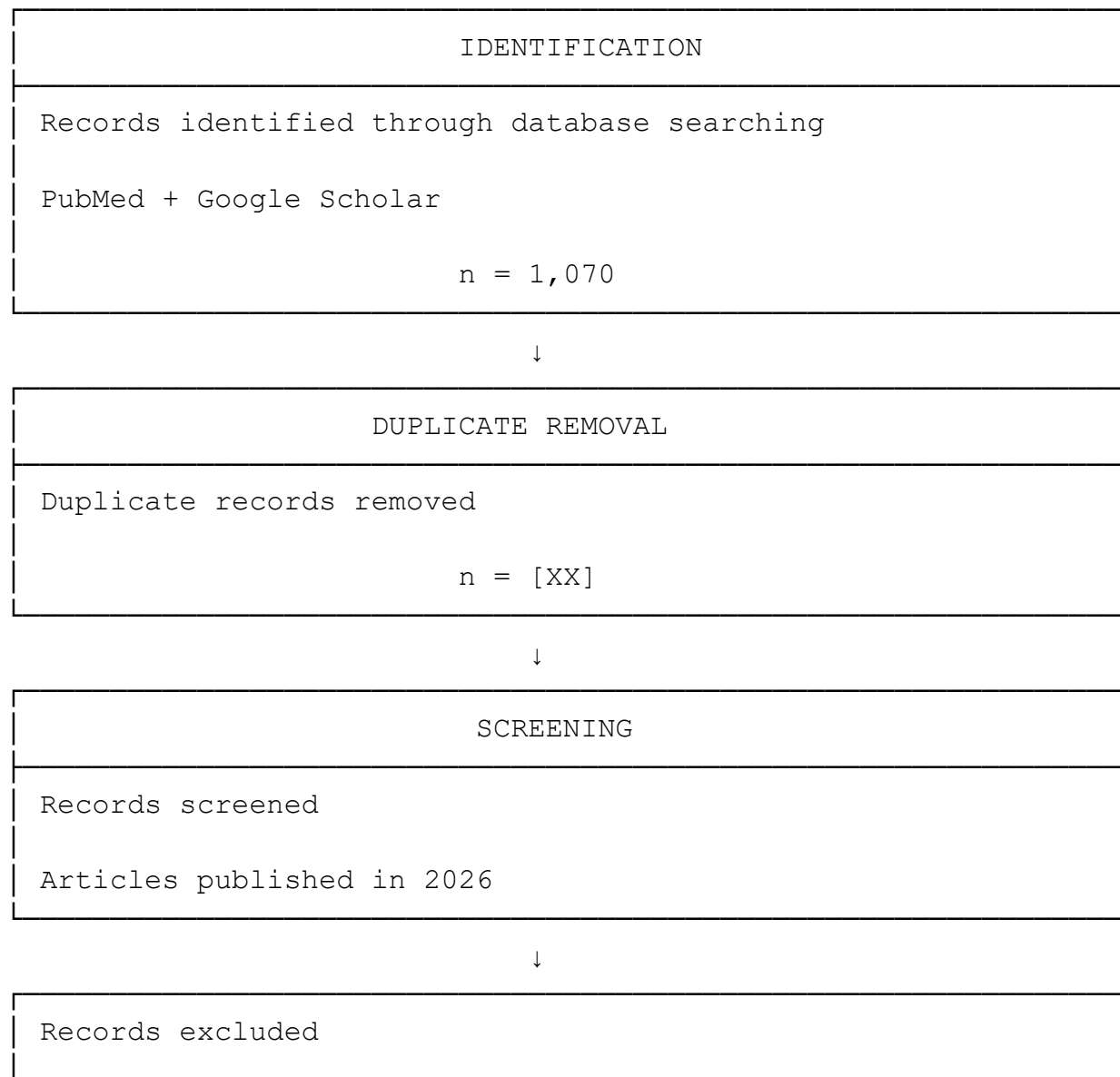
A comprehensive literature search was conducted using the electronic databases **PubMed and Google Scholar**. The search was focused on studies investigating pelvic floor muscle training, postpartum women, and urinary incontinence.

The search strategy used combinations of keywords and **Boolean operators (AND, OR)** to obtain relevant studies. The major search terms included:

("Pelvic Floor Muscle Training" OR "PFMT" OR "Kegel Exercise") AND ("Urinary Incontinence" OR "Stress Urinary Incontinence") AND ("Postpartum Women" OR "Postnatal Women" OR "Women After Childbirth")

Criteria	Inclusion Criteria	Exclusion Criteria
Study design	Only Randomized Controlled Trials (RCTs)	Non-RCTs, observational studies, cohort studies, case-control studies, case reports, etc.
Publication year	Studies published from 2026 onwards	Studies published before 2026
Population	Postpartum women of any age group	Studies involving non-postpartum populations
Intervention	Pelvic Floor Muscle Training (PFMT), pelvic floor exercises, or Kegel exercises	Studies without PFMT or pelvic floor exercise as an intervention
Outcome	Urinary incontinence and related urinary symptoms	Studies not assessing urinary incontinence or relevant urinary outcomes

PRISMA Flow Diagram



Articles not published in 2026 / not relevant



ELIGIBILITY

Full-text articles assessed for eligibility

Postpartum women + PFMT + urinary incontinence



STUDY DESIGN SCREENING

Randomized Controlled Trials (RCTs)

n = 229



INCLUDED

Articles included in the narrative review

n = 229

Article 1

Topic Name	Methodology	Result
Pelvic Floor Workout for Preventing Stress Urinary Incontinence in Primiparous Women: A Randomized Clinical Trial	Multicenter randomized clinical trial conducted across 9 hospitals in China. A total of 764 primiparous women aged 20–40 years with singleton pregnancy were randomized into an exercise group (n=382) and control group (n=382). The exercise group performed the PEFLOW program from 28 weeks of gestation until delivery , with guidance and follow-up every 2 weeks. The control group received usual medical care. Participants were assessed at 37 weeks of pregnancy and at 6 weeks, 3, 6 and 12 months postpartum. Outcomes included SUI	At 6 weeks postpartum, SUI incidence was significantly lower in the exercise group than in the control group (8.7% vs 13.9%, P=.03). The proportion of women achieving an MOS score ≥ 4 was significantly higher in the exercise group (17.8% vs 7.9%, P<.001). The findings indicate that PEFLOW during pregnancy may reduce the risk of postpartum SUI and improve pelvic floor muscle strength.

Topic Name	Methodology	Result
	incidence, symptomatic SUI and Modified Oxford Scale (MOS) score.	

Article 2

Topic Name	Methodology	Result
Effectiveness of Virtual Reality Technology Combined with Conventional Pelvic Floor Rehabilitation Training in Postpartum Myofascial Pelvic Pain Syndrome: A Randomized Controlled Trial	Randomized controlled trial involving 57 postpartum women with myofascial pelvic pain syndrome. Participants were randomly allocated to an experimental group (n=27), receiving virtual reality training combined with conventional pelvic floor rehabilitation , or a control group (n=30), receiving conventional pelvic floor rehabilitation alone. Both groups completed 10 treatment sessions . Pelvic floor function was assessed using surface electromyography, muscle thickness and Young's modulus were assessed using musculoskeletal ultrasound, and pelvic floor palpation pain was evaluated using the Visual Analog Scale.	The experimental group showed a significant reduction in relaxation time during the fast contraction phase of pelvic floor muscle activity (P<0.05). However, there were no significant between-group differences in pain intensity, pelvic floor muscle thickness or Young's modulus during resting and maximal contraction (P>0.05).

Article 3

Topic Name	Methodology	Result
Enhanced Postpartum Pelvic Floor Rehabilitation with Triple Therapy: Effects of Acupuncture, Biofeedback Electrical Stimulation, and Pelvic Floor Muscle Training on Urinary Incontinence and Sexual Function	Randomized controlled trial with evaluator and data-analyst blinding. 203 postpartum women with pelvic floor dysfunction were randomly divided into three groups: Group A (BES + PFMT, n=65), Group B (acupuncture + PFMT, n=68), and Group C (acupuncture + BES + PFMT, n=64). Outcomes were assessed at baseline and 6 months after treatment. Measures included pelvic floor EMG, muscle strength, MUCP, MFR, 1-hour pad test, ICIQ-SF, IIQ-7, FSFI and PISQ-31.	All three groups demonstrated significant improvements in pelvic floor EMG, muscle strength, MUCP, MFR, FSFI and PISQ-31, with reductions in leakage volume, ICIQ-SF and IIQ-7 scores. The greatest improvements were observed in the triple-therapy group (Group C) . No significant difference was found between Groups A and B. Adverse-event rates were comparable among groups.

Article 4

Topic Name	Methodology	Result
Effects of Kegel Training Combined with Acupoint Application in Preventing Postpartum Pelvic Floor Dysfunction: A Randomized Controlled Trial	Randomized controlled trial involving 110 first-time mothers . Participants were divided into a prevention group receiving Kegel exercises combined with acupoint application at Qi Hai and Guan Yuan points and a control group performing Kegel exercises alone. The intervention was provided during the postpartum period, with outcomes assessed at 42 days postpartum .	The combined-treatment group showed a significantly lower rate of urinary leakage and better Type II pelvic floor muscle strength, ICIQ-SF scores and Hamilton Anxiety Scale scores ($P<0.05$) . No significant differences were found for Type I muscle strength, vaginal dynamic pressure, PFDI-20 scores or bladder/cervical anatomical positioning ($P>0.05$). Only two minor cases of redness and itching were reported.

Article 5

Topic Name	Methodology	Result
Biomechanics-Driven Rehabilitation for Pelvic Floor Dysfunction: Efficacy and Predictors of Combined Biofeedback Electrical Stimulation and Hip Muscle Training in Postpartum Stress Urinary Incontinence	Randomized controlled trial involving 142 postpartum women with SUI . Participants were randomly allocated to a control group ($n=71$), receiving PFMT + biofeedback electrical stimulation (BES) , and an observation group ($n=71$), receiving PFMT + BES + hip muscle training . Outcomes included treatment efficacy, pelvic floor muscle strength using GRRUG criteria and ICIQ-SF scores. Logistic regression was also used to identify predictors of treatment success.	The combined-treatment group had a significantly higher overall efficacy rate than the control group (94.4% vs 74.6%, $P=0.001$) and a greater proportion of women with grade III or higher pelvic floor muscle strength (88.7% vs 70.4%, $P=0.007$). Leakage frequency, urine volume and quality-of-life impact improved significantly more in the combined group ($P<0.001$). Combined therapy was identified as an independent protective factor for treatment success.

Article 6

Topic Name	Methodology	Result
The Effect of Pelvic Muscle Relaxation Training on the Rehabilitation of Patients with Increased Pelvic Floor Muscle Tone: A Randomized Controlled Trial	Randomized controlled trial involving 190 postpartum women with increased pelvic floor muscle tone (resting sEMG $>4 \mu V$). Participants were randomly assigned to a treatment group ($n=95$) and control group ($n=95$). The control group received vaginal electrical stimulation and biofeedback for 5 weeks (15 sessions) , while the treatment group	After 15 sessions, resting sEMG was significantly lower in the treatment group than the control group (3.22 ± 1.35 vs $6.28 \pm 2.19 \mu V$, $P<0.001$). Modified Oxford Scale and pelvic floor Glazer scores were significantly higher in the treatment group. Both groups improved in POP-Q severity, but no significant between-group difference

Topic Name	Methodology	Result
	received the same treatment plus structured pelvic girdle muscle relaxation training consisting of 7 exercises performed 2–3 sets/day.	was found for endurance sEMG or POP-Q scores.

Article 7

Topic Name	Methodology	Result
The Efficacy of Transcutaneous Tibial Nerve Stimulation as an Adjunct to Standard Rehabilitation for Postpartum Pelvic Floor Dyssynergic Defecation in Primiparous Women: A Randomized Controlled Trial	Randomized controlled trial involving 40 primiparous women with postpartum pelvic floor dyssynergic defecation. Participants were allocated to an intervention group (n=20), receiving TTNS + standard rehabilitation , or a control group (n=20), receiving sham stimulation + standard rehabilitation. The intervention lasted 6 weeks . Primary outcome was constipation symptom score; secondary outcomes included clinical efficacy and pelvic floor surface EMG.	Both groups improved significantly after treatment (P<0.05). The intervention group demonstrated a significantly greater reduction in constipation symptom scores and a higher clinical effectiveness rate (90% vs 65%, P<0.05). Pelvic floor sEMG improved significantly more in the intervention group during resting, fast and slow contraction phases (P<0.05), while endurance contraction showed no significant between-group difference.

Result

Across the seven randomized controlled trials, pelvic floor–based physiotherapy interventions demonstrated generally positive effects on **pelvic floor muscle function, urinary continence, pelvic floor coordination, and postpartum rehabilitation**.

The PEFLOW study showed that prenatal pelvic floor exercise significantly reduced postpartum SUI, with an incidence of **8.7% compared with 13.9%** in the control group at 6 weeks postpartum. Pelvic floor muscle strength was also superior in the exercise group, as shown by a higher proportion of women achieving a Modified Oxford Scale score ≥ 4 . This suggests that structured pelvic floor exercise during pregnancy may provide a preventive benefit against postpartum urinary incontinence.

The addition of **virtual reality to conventional pelvic floor rehabilitation** produced a significant improvement in pelvic floor relaxation characteristics, particularly a reduction in relaxation time during rapid contractions. However, no significant differences were observed between groups for pain, muscle thickness, or Young's modulus, indicating that the additional effect of virtual reality may be more evident in muscle-control parameters than in structural or pain-related outcomes.

The triple-therapy study demonstrated improvements across all treatment groups in pelvic floor electrical activity, muscle strength, urethral function, urinary leakage, quality of life, and sexual function. However, the combination of **acupuncture, biofeedback electrical stimulation, and pelvic floor muscle training** produced the greatest overall improvement, suggesting that combining different therapeutic approaches may provide additional benefits for women with postpartum pelvic floor dysfunction.

Similarly, combining **Kegel exercises with acupoint application** resulted in better urinary leakage outcomes, Type II pelvic floor muscle strength, ICIQ-SF scores, and anxiety scores than Kegel exercise alone. However, some parameters, including Type I muscle strength, vaginal dynamic pressure, and pelvic organ anatomical position, did not differ significantly between groups.

The biomechanics-driven rehabilitation study found that adding **hip muscle training to pelvic floor muscle training and biofeedback electrical stimulation** substantially improved treatment outcomes. Overall treatment efficacy reached **94.4% compared with 74.6%** in the control group, while a greater proportion of women achieved higher pelvic floor muscle strength. Leakage frequency, urine volume, and the impact of urinary symptoms on quality of life also improved significantly.

In women with increased pelvic floor muscle tone, adding **pelvic muscle relaxation training** to electrical stimulation and biofeedback significantly reduced resting pelvic floor sEMG activity and improved pelvic floor muscle function. Although both groups showed improvement in pelvic organ prolapse severity, no significant difference was observed between groups for endurance sEMG or POP-Q scores.

The TTNS study further demonstrated the value of adjunctive physiotherapy. Women receiving **transcutaneous tibial nerve stimulation with standard rehabilitation** achieved a greater reduction in constipation symptoms and a higher clinical effectiveness rate (**90% vs 65%**) than those receiving sham stimulation with standard rehabilitation. Pelvic floor sEMG during resting, fast and slow contractions also improved more in the intervention group.

Overall, the included studies indicate that pelvic floor muscle training is an important component of postpartum rehabilitation, while combining it with strengthening, relaxation, biofeedback, electrical stimulation, hip exercises, neuromodulation, or other adjunctive techniques may further improve selected clinical outcomes.

Discussion

The findings of these seven randomized controlled trials demonstrate that **physiotherapy-based pelvic floor rehabilitation has an important role in both preventing and managing postpartum pelvic floor dysfunction**. Although the interventions differed considerably, most studies reported improvements in at least one clinically relevant domain, including urinary continence, pelvic floor muscle strength, muscle coordination, relaxation, bowel function, quality of life, or sexual function.

One of the most clinically important findings was observed in the PEFLOW trial, where pelvic floor exercise initiated during pregnancy reduced the occurrence of SUI after childbirth. This highlights the importance of adopting a **preventive physiotherapy approach** rather than waiting for pelvic floor symptoms to develop. Pregnancy places increasing mechanical and functional demands on the pelvic floor, while childbirth may

further challenge continence mechanisms. Regular supervised exercise may therefore help women develop adequate muscular control before these stresses become greater.

The improvement in pelvic floor strength observed following exercise is also consistent with the results of the other included studies. Kegel training, pelvic floor muscle training, and combined strengthening programs were repeatedly associated with improved muscle performance. The study incorporating hip muscle training is particularly relevant from a physiotherapy perspective because it demonstrates that pelvic rehabilitation may extend beyond isolated pelvic floor contractions. **The hip and lumbopelvic musculature contributes to pelvic stability and functional movement**, and strengthening these muscles may complement pelvic floor activation during daily activities.

Another important finding was that **multimodal rehabilitation tended to produce greater improvements than single-component treatment**. The triple-therapy study reported the greatest overall benefits when pelvic floor muscle training was combined with acupuncture and biofeedback electrical stimulation. Likewise, adding hip training to PFMT and electrical stimulation resulted in better treatment efficacy than PFMT with electrical stimulation alone. These findings suggest that postpartum pelvic floor dysfunction is multifactorial and may benefit from interventions targeting muscle strength, neuromuscular control, sensory feedback and functional pelvic stability simultaneously.

The results involving **biofeedback and electrical stimulation** are also relevant to physiotherapy practice. These techniques may provide additional sensory or neuromuscular input, particularly for women who have difficulty identifying or appropriately activating their pelvic floor muscles. The improvements in EMG activity reported in several studies indicate that objective changes in neuromuscular function may accompany subjective improvements in continence and pelvic floor symptoms.

Interestingly, the study involving virtual reality produced a more specific effect. Although virtual reality combined with conventional rehabilitation improved pelvic floor relaxation during rapid contractions, it did not significantly outperform conventional treatment for pain, muscle thickness or tissue mechanical properties. This suggests that newer technologies may be particularly useful for **motor control, engagement and exercise feedback**, but their additional clinical benefit over established pelvic floor rehabilitation remains uncertain.

The relaxation-training study provides another important perspective. Pelvic floor rehabilitation should not always focus on increasing muscle strength. In women with **excessive pelvic floor muscle tone**, inappropriate strengthening may not address the underlying problem. The significant reduction in resting sEMG following relaxation training indicates that physiotherapists should assess whether the pelvic floor is weak, overactive, or poorly coordinated before selecting an exercise programme. Therefore, individualized assessment is essential for appropriate treatment selection.

The TTNS study also broadens the role of pelvic floor physiotherapy beyond urinary symptoms. Improvement in dyssynergic defecation and pelvic floor EMG following tibial nerve stimulation suggests that **neuromodulation may influence pelvic floor coordination and bowel function**. This supports a more comprehensive view of pelvic floor rehabilitation in which physiotherapy addresses urinary, bowel, sexual and musculoskeletal dysfunction rather than focusing exclusively on SUI.

Despite these positive findings, the studies differed in **participants, intervention protocols, treatment duration, outcome measures and clinical conditions**. Therefore, direct comparison between studies should

be made cautiously. Some interventions demonstrated improvements in specific physiological outcomes without producing significant changes in pain or structural measurements. This indicates that statistically significant improvements in muscle activity do not necessarily translate into improvements in every clinical outcome.

Overall, the evidence supports a **multidimensional physiotherapy approach to postpartum pelvic floor rehabilitation**. Pelvic floor muscle training remains the central component, but its effectiveness may be enhanced when appropriately combined with hip strengthening, biofeedback, electrical stimulation, relaxation training, neuromodulation and other supportive techniques. Importantly, treatment should be individualized according to whether the patient presents with weakness, excessive muscle tone, poor coordination, urinary dysfunction, bowel dysfunction, or pain.

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